

## Grade 8 CRT Item Specifications

“Enduring and Important Knowledge” identified in previous grade-levels may be included within the context of some problems.

Prioritized Standards		Knowledge/Skills Assessed	Item Specifications
<p><b>1.8.1</b> Read, write, add, subtract, multiply, and divide real numbers in various forms including radicals, exponential, and scientific notation. (C, P)</p> <p><b>1.8.2</b> Compute with rational and irrational numbers to solve a variety of problems including rates, recipes, unit costs, and percents (e.g., discounts, interest, sale prices, commissions, and taxes). (PS)</p> <p><b>1.7.3</b> Use absolute value and properties of real numbers to solve problems. (P)</p> <p><b>1.8.6</b> Compare and order rational numbers. (C, P)</p> <p><b>1.8.7</b> Estimate in problem-solving situations and in practical applications; determine the reasonableness of the answer and verify the results. (P, PS)</p> <p><b>1.8.9</b> Explain the relationship between fractions, decimals, and percents; translate among various representations of equal numbers (e.g., from fractions to decimals to percents, various forms of “1” such as 3/3 or 16/16) to solve problems efficiently. (P, PS)</p>	Concepts	<p><b>1.8.1</b> Read and write real numbers in various forms.</p> <p><b>1.8.6</b> Compare rational numbers.</p>	<p><b>1.8.1</b> Real number forms can include radicals, exponential, and scientific notation.</p> <p><b>1.8.6</b> Rational numbers are to be in common form.</p>
	Procedures	<p><b>1.8.1</b> Add, subtract, multiply, and divide real numbers in various forms.</p> <p><b>1.7.3</b> Use absolute value and properties of real numbers to solve problems.</p> <p><b>1.8.6</b> Order rational numbers.</p> <p><b>1.8.7</b> Estimate in practical mathematical applications; determine the reasonableness of the answer.</p> <p><b>1.8.9</b> Translate among fractions, decimals and percents and among various representations of equal numbers to solve problems efficiently.</p>	<p><b>1.8.1</b> Real number forms can include radicals, exponential, and scientific notation.</p> <p><b>1.7.3</b> Use absolute value in simple computation problems.</p> <p><b>1.8.6</b> Item should require conversions in common form only.</p> <p><b>1.8.7</b> Use one-step estimation only.</p> <p><b>1.8.9</b> Representations of equal numbers can take the form of fractions to decimals to percents, or various forms of “1” such as 3/3 or 16/16.</p>
	Problem Solving	<p><b>1.8.2</b> Compute with rational and irrational numbers to solve a variety of contextual real-world problems.</p> <p><b>1.8.7</b> Estimate in contextual real-world problem-solving situations; determine the reasonableness of the answer and verify the results.</p> <p><b>1.8.9</b> Explain the relationship between fractions, decimals, and percents; translate among various representations of equal numbers to solve contextual real-world problems efficiently.</p>	<p><b>1.8.2</b> Problems may include rates, recipes, unit costs, and percents (e.g., discounts, interest, sale prices, commissions, and taxes). Use simple numbers that allow for assessment of application.</p> <p><b>1.8.7</b> Answer choices for the item can ask for specific estimations or for a range for estimation, (e.g., less than \$10, between \$10 and \$20).</p> <p><b>1.8.9</b> Representations of equal numbers can take the form of fractions to decimals to percents, or various forms of “1” such as 3/3 or 16/16. Items should focus on translation and equivalent forms.</p>

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<b>Prioritized Standards</b>		<b>Knowledge/Skills Assessed</b>	<b>Item Specifications</b>
<p><b>2.8.1</b> Use inductive reasoning to find the missing term in number and geometric patterns and to generalize basic patterns to the <math>n</math>th term, with and without calculators; use written, oral, and symbolic language to identify and describe patterns, sequences, and functions. (C, P, PS)</p> <p><b>2.8.2</b> Translate among verbal descriptions, graphic, tabular, and algebraic representations of mathematical situations. (P )</p> <p><b>2.8.3</b> Identify, model, describe, and evaluate relationships, including functions, using a variety of methods with and without technology. (C, P)</p> <p><b>2.8.4</b> Add and subtract binomials; describe the connection between the algebraic process and the arithmetic process. (P )</p> <p><b>2.8.5</b> Describe how a change in one variable of a mathematical relationship affects the remaining variables using various tools and methods. (P, PS)</p> <p><b>2.8.6</b> Model, identify, and solve linear equations and inequalities; relate this process to the order of operations. (C, P, PS)</p> <p><b>2.8.7</b> Solve simple linear equations and connect that process to the order of operations. (P )</p>	<b>Concepts</b>	<p><b>2.8.1</b> Use inductive reasoning to find the missing term in number and geometric patterns.</p> <p><b>2.8.3</b> Identify and model functional relationships using a variety of methods.</p> <p><b>2.8.6</b> Identify linear equations and inequalities.</p>	<p><b>2.8.1</b> Find the missing term in the pattern.</p> <p><b>2.8.3</b> Limited to linear functions only. No function notation.</p> <p><b>2.8.6</b> Items must be straight forward. Items may ask students to recognize the model of an equation or inequality or based on the model recognize the equation or inequality. Absolute value equations can be assessed.</p>
	<b>Procedures</b>	<p><b>2.8.1</b> Use inductive reasoning to extend the number and geometric patterns.</p> <p><b>2.8.2</b> Use symbols to translate among verbal descriptions, graphic, tabular, and algebraic representations of mathematical situations.</p> <p><b>2.8.3</b> Evaluate functional relationships using a variety of methods.</p> <p><b>2.8.4</b> Add and subtract binomials.</p> <p><b>2.8.5</b> Determine how a change in one variable of a mathematical relationship affects the remaining variables.</p> <p><b>2.8.6</b> Solve linear inequalities.</p> <p><b>2.8.7</b> Solve simple linear equations; connect process to order of operations.</p>	<p><b>2.8.1</b> Extend the pattern in the problem.</p> <p><b>2.8.3</b> Limited to linear functions only. No function notation.</p> <p><b>2.8.5</b> Limit to two variables only.</p> <p><b>2.8.6</b> Items may also assess relating order of operations to solving inequalities.</p>
	<b>Problem Solving</b>	<p><b>2.8.1</b> Generalize patterns to the <math>n</math>th term.</p> <p><b>2.8.5</b> Determine, describe, and apply how a change in one variable of a mathematical relationship affects the remaining variables in contextual real-world problems.</p> <p><b>2.8.6</b> Identify, model, and solve linear equations and inequalities in a contextual real-world problem.</p>	<p><b>2.8.1</b> Write the rule to generalize the pattern to the <math>n</math>th term. Write a pattern based on a rule.</p> <p><b>2.8.6</b> Order of operations may be included in the process.</p>

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<p><b>3.7.1</b> Estimate and convert units of measure for mass and volume within the same measurement system; compare corresponding units of the two measurement systems. (C, P)</p> <p><b>3.8.2</b> Demonstrate an understanding of precision, error, and tolerance in measurement using the appropriate measurement tool to the required degree of accuracy. (C, P, PS)</p> <p><b>3.8.3</b> Select and apply appropriate formulas to solve problems; identify the relationship between changes in area and volume and changes in linear measures of figures. (C, P, PS)</p> <p><b>3.8.5</b> Apply ratios and proportions to calculate rates and as a method of indirect measure (e.g., miles per hour, cost per unit). (PS )</p> <p><b>3.7.6</b> Use elapsed time to solve practical problems (e.g., develop schedules, plan trips). (PS )</p>	<p><b>Concepts</b></p> <p><b>3.7.1</b> Compare corresponding units of measure for mass and volume of the two systems (customary and metric).</p> <p><b>3.8.2</b> Identify the correct measurement tool needed for a task.</p> <p><b>3.8.3</b> Select appropriate formulas to solve problems.</p>	<p><b>3.7.1.</b> Volume should be interpreted as capacity. Limited to the following: ounces, pounds, and tons; ounces, cups, pints, quarts and gallons; grams milligrams, and kilograms; liters, milliliters.</p> <p><b>3.8.3</b> Limit formulas to perimeter, area, circumference, volume and surface area.</p>
	<p><b>Procedures</b></p> <p><b>3.7.1</b> Estimate and convert units of measure for mass and volume within the same measurement system (customary and metric).</p> <p><b>3.8.2</b> Demonstrate an understanding of tolerance in measurement to the required degree of accuracy.</p> <p><b>3.8.3</b> Apply appropriate formulas to solve problems.</p>	<p><b>3.7.1</b> Conversion factor should be embedded in item. Volume should be interpreted as capacity. Limited to the following: ounces, pounds, and tons; ounces, cups, pints, quarts and gallons; grams milligrams, and kilograms; liters and milliliters.</p> <p><b>3.8.2</b> Tolerance problems can not use the <math>\pm</math> symbol.</p> <p><b>3.8.3</b> Limit formulas to perimeter, area, circumference, volume and surface area.</p>
	<p><b>Problem Solving</b></p> <p><b>3.8.2</b> Solve real-world problems dealing with precision, error and tolerance.</p> <p><b>3.8.3</b> Select and apply appropriate formulas to solve contextual real-world problems; identify the relationship between changes in area and volume and changes in linear measures of figures.</p> <p><b>3.8.5</b> Apply ratios and proportions to calculate rates and as a method of indirect measure to contextual real-world problems.</p> <p><b>3.7.6</b> Solve contextual real-world problems involving elapsed time.</p>	<p><b>3.8.2</b> Tolerance problems can not use the <math>\pm</math> symbol. Tolerance problems in <b>constructed response only</b>. Precision problems must involve different units; accuracy problems involve the same units. (Give actual object measured and four measurements using the same unit)</p> <p><b>3.8.3</b> Limit formulas to perimeter, area, circumference, volume and surface area.</p> <p><b>3.8.5</b> Indirect measure items may deal with problems of miles per hour, or cost per unit. Proportion must be given.</p>

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<b>4.7.1</b> Identify, describe by properties, classify, compare, and draw regular and irregular polygons; find the sum of the interior angles. (C, P, PS)  <b>4.8.2</b> Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes. (C, P, PS)  <b>4.8.3</b> Use coordinate geometry and models to change scale (enlarge and reduce). (P, PS)  <b>4.8.5</b> Use coordinate geometry to represent and interpret relationships defined by equations and formulas, (including distance, midpoint, and slope), with and without technology. (C, P, PS)  <b>4.8.6</b> Form generalizations and validate conclusions about properties of geometric shapes. (PS )  <b>4.8.7</b> Verify and explain the Pythagorean Theorem using various methods; determine missing sides and angles of triangles based on properties of their sides and angles. (P, PS)	Concepts	<b>4.7.1</b> Identify, classify, and compare regular and irregular polygons. Describe properties of regular and irregular polygons.  <b>4.8.2</b> Identify corresponding parts.  <b>4.8.5</b> Use coordinate geometry to represent relationships defined by equations.	<b>4.8.2</b> Identify corresponding parts of congruent and similar shapes.  <b>4.8.5</b> Given a graph of a line identify the equation. Given the equation identify the graph.
	Procedures	<b>4.7.1</b> Find the sum of the interior angles.  <b>4.8.2</b> Apply the properties of equality and proportionality to solve problems involving congruent or similar shapes.  <b>4.8.3</b> Use coordinate geometry and models to change scale.  <b>4.8.5</b> Determine midpoint, distance and slope using coordinate geometry.  <b>4.8.7</b> Use the Pythagorean Theorem and the Angle Sum Theorem to solve mathematical problems.	<b>4.7.1</b> Limit to three to ten sided figures.  <b>4.8.3</b> Scale can either be to enlarge or reduce.  <b>4.8.7</b> Limit to triples or radical form only. Item may ask student to determine the length of any side of a right triangle.
	Problem Solving	<b>4.7.1</b> Determine the sum of the interior angles from contextual real-world problems. <b>4.8.2</b> Apply the properties of equality and proportionality to solve contextual real-world problems involving congruent or similar shapes. <b>4.8.3</b> Use coordinate geometry and models to change scale in contextual real-world problems. <b>4.8.5</b> Use coordinate geometry to represent and interpret relationships defined by equations and formulas (including distance, midpoint, and slope) in real-world problems. <b>4.8.6</b> Form generalizations and validate conclusions about properties of geometric shapes including parallel lines, perpendicular lines, bisectors, triangles, and quadrilaterals. <b>4.8.7</b> Use the Pythagorean Theorem and the Angle Sum Theorem to solve real-world problems.	<b>4.7.1</b> Limit to three to ten sided figures  <b>4.8.3</b> Scale can either be to enlarge or reduce.  <b>4.8.6</b> Label vertices in a clockwise order beginning at the top vertex.  <b>4.8.7</b> Limit to triples or radical form only. Item may ask student to determine the length of any side of a right triangle.

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<b>Prioritized Standards</b>		<b>Knowledge/Skills Assessed</b>	<b>Item Specifications</b>
<p><b>5.8.1</b> Organize, display, read, and analyze data, with and without technology, using a variety of displays including box and whisker plots. (C, P, PS)</p> <p><b>5.8.2</b> Find the theoretical probability of an event using different counting methods (e.g., tree diagrams, sample spaces, and organized lists) and compare those results with actual (experimental) results, differentiating between the probability of an event and the odds of an event. (C, P, PS)</p> <p><b>5.8.3</b> Find the number of combinations possible in given situations using a variety of counting methods. (C, P, PS)</p> <p><b>5.7.4</b> Select, use, and graph (when possible) measures of variability including range, distribution and possible outliers. (C, PS)</p> <p><b>5.8.5</b> Evaluate arguments that are based on data analysis for accuracy and validity; analyze the effect a change of scale or a change of format will have on statistical charts and graphs. (PS )</p> <p><b>5.8.6</b> Formulate reasonable inferences and projections based on interpolations and extrapolations of data to solve problems. (PS )</p>	<b>Concepts</b>	<p><b>5.8.1</b> Read data using a variety of displays including box and whisker plots.</p> <p><b>5.8.2</b> Determine the theoretical probability using different counting methods.</p> <p><b>5.8.3</b> Determine which expression could be used to determine the number of combinations possible in a given situation.</p> <p><b>5.7.4</b> Identify measures of variability including range, distribution and possible outliers.</p>	<p><b>5.8.1</b> Items must ask a single question about a data display.</p> <p><b>5.8.2</b> Counting method must be a display, (including lists), and must be provided. Limit to simple event.</p> <p><b>5.8.3</b> Expression not based on combination formula.</p>
	<b>Procedures</b>	<p><b>5.8.1</b> Organize and display data using a variety of displays including box and whisker plots.</p> <p><b>5.8.2</b> Find probability without a diagram. Find probability given the odds of an event. Find odds given the probability of an event.</p> <p><b>5.8.3</b> Find the number of combinations possible in given situations using a variety of counting methods.</p>	<p><b>5.8.1</b> Items must ask student to select the correct display given data. May include computation.</p> <p><b>5.8.3</b> Number of combinations must not exceed 24.</p>
	<b>Problem Solving</b>	<p><b>5.8.1</b> Organize, display, read, and analyze data using a variety of displays including box and whisker plots.</p> <p><b>5.8.2</b> Compare theoretical and experimental probabilities.</p> <p><b>5.8.3</b> Find the number of combinations possible in given real-world problem situations using a variety of counting methods.</p> <p><b>5.7.4</b> Use, and graph (when possible) measures of variability to solve contextual real-world problems.</p> <p><b>5.8.5</b> Evaluate arguments that are based on data analysis for accuracy and validity; analyze the effect a change of scale or a change of format will have on statistical charts and graphs.</p> <p><b>5.8.6</b> Make inferences and projections based on interpolations and extrapolations of data to solve real world problems.</p>	<p><b>5.8.1</b> Items may ask for a comparison of data from the data display or a computation of information taken from the display. Organize and display in <b>constructed response only</b>.</p> <p><b>5.8.3 For constructed response only.</b> Number of combinations must not exceed 24.</p> <p><b>5.7.4</b> Measures of variability may include range, distribution and possible outliers. Item can ask for student to find the “grade” to give the student an average grade of 75% on tests, assignments etc...</p> <p><b>5.8.6</b> Items should focus on inferences and projections (e.g., range of answers).</p>

